tella acricula, Cardita delicatula, Placotrochus deltoideus; also marsupial bones, volcanic bombs, calcareous and ferruginous concretions. Recent shells from same lake and Lake Gnotuk, living plankton obtained by tow-net in Lake Bullenmerri, 5th September, including Copepoda, Amphiphoda, Rotifers, Diatoms, Desmids, Algæ, &c.

By Master W. Searle.—Moth. *Colussa denticulata.*

After the usual conversazione the meeting terminated.

SUPPLEMENTARY NOTES ON THE SANDRINGHAM FLORA.

By C. S. Sutton, M.B.

(*Read before the Field Naturalists' Club of Victoria, 11th March*, 1912.)

The reasons for the following notes are more particularly to record a number of additions to the census of the Sandringham flora, as given in my previous paper, "Notes on the Sandringham Flora" (*Vict. Nat.*, xxviii., p. 5), and, in the light of a better knowledge of the locality and the aid of a map, to more exactly define the original limits of the formation, and indicate the areas at present occupied by what remains of it; also to make some remarks concerning some of its more notable plants and plant associations, and incidentally attempt the definition of such ecological terms as may have been used.

For many of the names added to the census, I must in the first place acknowledge my indebtedness to Messrs. T. S. Hart, Charles French, jun., and P. R. H. St. John.

Mr. Hart furnished me with much interesting matter, which he has kindly permitted me to incorporate in my notes, and Messrs. French and St. John indicated to me that most interesting locality south from Oakleigh, where so many plants not met with, or only rarely met with, elsewhere in the formation are now growing. To Mr. French also I owe the opportunity of inspecting some patches and remnants of the original vegetation in the vicinity of Ashburton and Canterbury.

Dealing with the new names added to the census in a somewhat promiscuous fashion, mention will at the same time be made of other plants already noted, but now occurring perhaps only rarely.

According to Mr. Hart's notes, *Velleya paradoxa* grew on the cliff, extending from the drain south of Holyrood-street, Brighton Beach, to near where the old tea-tree begins. There also, "where a clayey soil exists, with the underlying calcareous rock sometimes exposed," were collected the Short Helmet Orchid, *Pterostylis Mackibbini*, Blunt Helmet Orchid,

P. curta, Slender Bush-pea, *Pultenæa tenuifolia*, and *Myoporum humile*.

In the railway reserve at Brighton Beach, north of the Were-street bridge, the Curved Rice-flower, *Pimelea curviflora*, once grew, and perhaps still exists. In the Hampton station yard could be found at one time the *Velleya* and the Blue Eryngo, *Eryngium rostratum*; in a paddock a little to the north the Narrow-leaved Bitter-pea, *Daviesia corymbosa*, and just outside the railway fence the Purple Diuris, *Diuris punctata*. The latter he also found between Mentone and Cheltenham. Close to the reserve at the latter place the Bulbous Fringe-lily, *Thysanotus tuberosus*, used to be found, and near by the Large Podolepis, *P. acuminata*, Spoon-leaved Sundew, *Drosera spathulata*, and the two rather uncommon orchids—the Crow Orchid, *Orthoceras strictum*, and Long-leaved Duck Orchid, *Cryptostylis longifolia*. The reserve and its vicinity was closely searched on two occasions since reading Mr. Hart's notes, without detecting any trace of these. The two spike-rushes (Heleocharis) were found at Sandringham, and *H. sphacelata* also at Cheltenham and Moorabbin.

The White Sunray, *Helipterum corymbiflorum*, Long-leaved Flax-lily, *Dianella longifolia*, Delicate Glycine, *Glycine clandestina*, Stout Hood-orchid, *Thelymitra epipactoides*—nearly east of the golf links, beyond the Bluff-road—Blue Aster, *Aster huegelii*, Wandering Speedwell, *Veronica peregrina*, were all at one time noted about Sandringham, *Lobelia microsperma* at Black Rock, and the Snowbush Aster, *Aster stellulatus*, at East Brighton and at Cheltenham. Quoting Mr. Hart almost *literatim*:—"About and south of the swamp on the Moorabbin-road, just south of South-road and a couple of miles or more east of Moorabbin station, I got the Slender Flowering-rush, *Xyris gracilis*, the White Velvet bush, *Lasiopetalum Baueri*, and *Myoporum humile*: the Bulrush, *Typha angustifolia*, right on the Moorabbin-road, the Common Reed, *Arundo phragmites*, near by, and in the vicinity, the Side-flowered Bladderwort, *Utricularia lateriflora*, Forked Sundew, *Drosera binata*, and Lesser Red Helmet, *Corysanthes unguiculata*. A little south-west of the junction of Centre and Moorabbin roads used to be a good spot for the Dotted Hood-orchid, *Thelymitra ixioides*. Further east, along Centre-road, I have found the Bearded Helmet-Orchid, *Pterostylis barbata*, Cockatoo Orchid, *Caleya major*—the only example ever noticed in the district—and Slender Caladenia, *Caladenia congesta*. This latter was pronounced by the Baron a small variety, and apparently new. I never found it again. The Coral Fern, *Gleichenia circinata*, once grew in a drain just off Centre-road, also south from there and east of what we knew as the old Dandenong track—a crooked road running

south-east. The same fern occurred also some distance south of Balcombe's-road.

"The old Dandenong track beyond Dingley once yielded very fine orchids, especially a white variety of the Spider Orchid, *Caladenia Patersoni*." Mr. Hart also records the Prickly Couch-grass, *Zoysia pungens*, from Brighton Beach, Mud Dock, *Rumex bidens*, from Moorabbin, and Swamp Club-rush, *Scirpus inundatus*. Regarding the River Red Gum, *Eucalyptus rostrata*, as to the occurrence of which my own recent observations have left no doubt, Mr. Hart says they are to be found "in Caulfield—for instance, near the corner of Bambra and Glen Eira roads"; and further—"I have always regarded the gums at the Brighton Cemetery as these. My uncle, Mr. Joseph Hart, pointed out to me certain posts which he supplied in 1857 still standing (last year) in a fence in Glen Eira-road, just east of the Caulfield Town Hall." In another place he says:—"Red Gums occurred along the valley which runs north of Middle Brighton station. It occurs to me that perhaps they cease about the same place, as the drainage system departs from regular valleys and tends to many closed hollows, as at Sandringham." In a later note Mr. Hart says: "Red Gums occur north from Hampton station and on or near the Point Nepean-road beyond Moorabbin station." It was the opinion of Mr. Joseph Hart that there were no Red Gums on the track from Balcombe's block, near the Brighton Cemetery, to Balcombe's block beyond Schnapper Point, but this old road or track used to keep the ridge further east, and this explains why they were not noticed. Apart from the Red Gums which exist plentifully on the flats about Dandenong Creek and the Yarra, and extend up the valleys of Gardiner's Creek and its branches, many of which must once have been closely associated with the plants on the fringe of the Sandringham formation, others have been noted by myself quite close to Mordialloc, on a flat surrounded by an association of *Eucalyptus viminalis*, bracken, and *Ricinocarpus pinifolius*. Again, they may be seen just off the Chesterville road and on the Point Nepean-road to the east of Highett; south from Murrumbeena, to the east of Ashburton, and on the Camberwell golf links. Though the species may thus be said to be *in* the formation, it is not, strictly speaking, *of* it.

Mr. Charles French, jun., writes to me that, on looking up his field-notes, he finds the Twin-leaved Bird Orchid, *Chiloglottis diphylla*, was fairly common at Oakleigh; that between the same place and Cheltenham he has collected the Red Hood-orchid, *Thelymitra Macmillani*, the Slender Caladenia, *C. congesta*, the Dixon Leek-orchid, *Prasophyllum Dixoni*, and the Stout Leek-orchid, *P. Frenchii*; near Cheltenham, the Wedge-

leaved Burnettia. *B. cuneata*; and between there and Mentone the lovely Purple Diuris, *D. punctata*. He further mentions that the most noticeable of our Lobelias, *L. simplicicaulis*, is pretty common on a flat at the back of the tram-sheds at Black Rock.

In explanation of the unlooked-for occurrence of the Golden Shaggy-pea, *Oxylobium ellipticum*, at Black Rock, Mr. Charles French writes:—"As one who helped to lay out the garden at Black Rock in 1855, I may say that this plant, together with many others obtained from the Botanic Gardens, seeded, and was carried all over the place, and you will find several eucalypts, &c., in Ebden's paddock which are also escapees." The Oxylobium thus cannot be regarded as belonging to Sandringham. Mr. French also remarked that he missed "the dear little Preiss Club-moss," *Selaginella Preisseana*, from the list. This has since been found in great abundance near to Heatherton.

Calochilus campestris and *Diuris palustris* were both found by Mr. Charles French, as stated in his paper on "The Orchideæ of Victoria," *Vict. Nat.*, vol. i.—the first on the Caulfield Race-course and at Cheltenham, and the other once only near the Observatory.

The remaining additions, other than those of my own finding, have been taken from Hannaford's "Jottings" and Mueller's "Plants Indigenous to the Colony of Victoria," and for these I feel somewhat apologetic, as they should not have escaped notice in making up the census in the first place. They are:—The Oval Shepherd's Purse, *Capsella elliptica*, C. A. Meyer = *C. procumbens*, Fries. = *Stenopetalum incisæfolium*, Hook., fils: the first and second names described respectively in "Pl. Indig." and the "Flora Australiensis" as occurring in "boggy, slightly saline places around Port Phillip." These authorities would perhaps be sufficient, but in Hannaford's "Jottings" we have the habitat more particularly set down as "sandy cliffs by the sea near Brighton," under *Capsella australasica*, Ferd. Mueller, figured in "Icones Plantarum," vol. iii., tab. 276, and there named *Stenopetalum incisifolium* (*sic*). No other record has, however, been elsewhere found of *C. australasica*. Salt Plagianth, *Plagianthus spicatus*, Benth. = *Sida Lawrenciana*, F. Muell., "in salt-marshes scattered along the coast . . . . at the entrance of the Yarra" ("Pl. Indig.") Many-flowered Starwort, *Stellaria multiflora*, Hook., "rocky places near St. Kilda" (Hannaford, "Jottings"): Small Pearlwort, *Sagina apetala*, Linné, "in low meadows around Port Phillip" ("Pl. Indig."): Milky Beauty-heads, *Calocephalus lacteus*, Less., "among Juncaceæ at St. Kilda, &c." (Hannaford, "Jottings").

In the "Jottings" we read:—"A short walk through this noble forest of Eucalypti and Banksias (Honeysuckles, with bottle-brush-shaped flowers) and Casuarinæ (Sheoaks) brings us to St. Kilda"—presumably from Melbourne; and in describing his walk along the sea-shore there and "aside through a beautiful scrub of *Ricinocarpus sidæformis*" (*R. pinifolius*, Desf.), "a useful purgative," as he incidentally remarks—he mentions, among others, as occurring in the locality, "the graceful lilac *Diopogon leimonophilus*"—obviously a misprint for *Dichopogon leimonophilus*, Ferd. Mueller, given in the catalogue at the end of the book, and which, doubtless, is *D. strictus*, Baker (*Arthropodium strictum*, R. Brown); Dwarf Aphelia, *Aphelia pumilio*, *A. cyperoides* (a Western Australian species not occurring in Victoria—probably *A. gracilis* was meant), *Desvauxia tenuior*, R. Brown, Hairy Centrolepis, *Centrolepis strigosa*, R. and S., var. *tenuior*, Small-flowered Buttercup, *Ranunculus sessiliflorus* (*R. parviflorus* L., var. *sessiliflorus*, Slender Pennywort, *Hydrocotyle tripartita*, and Dwarf Bog-rush, *Chætospora axillaris* (*Schœnus axillaris*, Hook., f.) *Brachycome angustifolia*, D. C., "marshy places near Brighton" ("Jottings"). This name could not be traced. It is not likely to be *B. angustifolia*, A. Cunn., and very probably is what we now know as *B. cardiocarpa*, F. v. M. *Lobelia alata*, R. Br., "in the lagoon near Liardet's, &c.," is also mentioned in the "Jottings," and is almost certainly *L. alata*, Labill. (*L. anceps*, Thunb.)

In the "Jottings" are also *Goodenia lanata*, R. Br., hab. "Brighton"—evidently the woolly var. *primulacea* of *G. geniculata*, R. Br., and *Tetrachæta perennis*, Ferd. Mueller, hab. "near St. Kilda," a composite, which is also not found elsewhere mentioned; *Daviesia corymbosa*, hab. "Hawthorn"; *Pimelea curviflora*, R. Br., "hilly pastures near Hawthorn"; and *Eurybia ciliata*, Benth. (*Olearia ciliata*, F. Mueller = *Aster huegelii*, F. Mueller), at Botanic Gardens, Melbourne.

Several other names might have been added with some reason—*e.g.*, among others, *Comesperma defoliatum*, F. v. M., "scattered over sandy ridges from Port Phillip" ("Pl. Indig."), and *Zygophyllum Billardieri*, found "on coast rocks or drift sand from Port Phillip" ("Pl. Indig."); but they have been left out, as the locality is not sufficiently definite.

In the course of many visits to various parts of the district in the autumn and winter just past, it has been possible to verify many of Mr. Hart's records. These visits, mainly for the purpose of locating the vegetation still existing and of marking out the boundary of the formation, and, though not taken in the flowering-time of the majority of the plants, have yet enabled me to add to the list the considerable number of

species now to be mentioned. Most of these were noted in the eastern part of the formation, to the south of Oakleigh, Clayton, and Springvale. The presence here of a number of forms not occurring elsewhere in the district is no doubt due in part to contiguity with the neighbouring formation, the plants of which tend to invade the area under consideration, but mostly to the fact, evidenced by the presence of several springs, that the water content of the soil is probably greater than in the western part. At one of these springs, south of Oakleigh, just a little north of the old Dandenong track and east of Warragul road, the Woolly Tea-tree, *Leptospermum lanigerum*, was found, with the Straight-leaved Acacia, *Acacia stricta*, forming part of the thick scrub screening the water. The Clustered Bush-pea, *Pultenæa dentata*, was stretching its slender stem up amongst the less dense growth, and Brownbeards, *Calochilus Robertsoni*, still further out in the fringe. In the water, the Budding Club-rush, *Scirpus prolifer*, was got in association with Sphagnum.

On the occasion of one of my visits to this locality with Messrs. Barnard and Charles French, jun., the latter pointed out, very much to our surprise, the Batswing Fern, *Pteris incisa*, Ground Polypody, *Polypodium punctatum*, and small plants of the Prickly Tree-fern, *Alsophila australis*, and Common Tree-fern, *Dicksonia Billardieri*, which his keen eye for natural objects had noticed in an obscure water-channel on a previous visit.

In thick scrub, somewhat away from the water, the Coral Fern, *Gleichenia circinata*, was again noted. Great masses of this charming plant were upheld to a height of 6 or 8 feet, and its freshness and luxuriance were pleasant to see so close to town. Still further interest was lent to the vicinity when Mr. St. John, after some diligent searching, succeeded in re-discovering a couple of almost unnoticeable plants of the Holly Grevillea, *G. ilicifolia*, on the high ground to the south-east of the spring, and the Small-flowered Boronia, *Boronia parviflora*, just east of the boiling-down works in the lane to the west leading to Centre-road. The Cut-leaved Xanthosia, *Xanthosia dissecta*, is to be seen in thick tufts on the Metropolitan golf links.

Another locality, near the junction of Heatherton and Clayton roads, also marked by a spring—or, rather, two springs close together—was fertile in plants not previously noted. Here the Golden Bush-pea, *Pultenæa Gunnii*, Clustered Bush-pea, *P. dentata*, Slender Flowering-rush, *Xyris gracilis*, and Creeping Club-moss, *Lycopodium laterale*, were not uncommon, and the damp surrounding area furnished frequent tussocks of the Coast Bog-rush, *Lepidospora tenuissima*, the Angular Twig-rush, *Gahnia tetraquetra*, F. v. M. (*Cladium tetraquetrum*,

Hook. f.), Spreading Rope-rush, *Calostrophus lateriflorus*, Narrow Sword-sedge, *Lepidosperma lineare*, and Thread Sword-sedge, *L. filiforme*. In the vicinity also were the Tasman Scale-rush, *Lepyrodia Tasmanica*, and such cyperaceous plants as the Black Saw-sedge, *Gahnia radula*, Giant Saw-sedge, *G. psittacorum*, Giant Sword-sedge, *Lepidosperma exaltatum*, Hill Sword-sedge, *L. concavum*, and the Common Love-grass, *Eragrostis Brownii*. South-west from Clayton, in the water reserve, but restrained within bounds and cleared of surrounding scrub, is yet another spring, which has seemingly been used as a source of water supply for many years. What Mr. St. John considers to be the Rosemary Everlasting, *Helichrysum rosmarinifolium*, and hitherto regarded as a sub-alpine species from the North-East, was found near by.

On damp ground here, and also near Mordialloc—probably, too, in many other places—the little Crucifer, the Hairy Bitter-cress, *Cardamine hirsuta*, is growing plentifully. The Pale Mat-rush, *Xerotes glauca*, and Narrow-leaved Bitter-pea, *Daviesia corymbosa*, occur close to Clayton. The latter was seen only very occasionally elsewhere, whereas *D. latifolia* is quite copious at Springvale, and not infrequently in other places. The curious minute Side-flowered Bladderwort, *Utricularia lateriflora*, was flowering in May in the drain along Heatherton-road, and at the junction of this and what is locally known as the Turtle-road, the Drooping Cotton-wood, or Chinese Scrub, *Cassinia arcuata*, was in abundance on broken ground. This plant is probably a recent comer here, and will surely not waste any time in extending its habitat.

Of the Spreading Acacia, *Acacia diffusa*, a few belated bushes are near the Murrumbeena station, and no doubt owe their continued existence to the formidable nature of their defensive phyllodes. The Caltrops, *Tribulus terrestris*, and the Small Pigface *Mesembryanthemum tegens*, once so prevalent on the flats behind the barracks on the St. Kilda-road, were recognized on the occasion of a recent Club excursion to Coode Island.

In the lane leading west from Clayton-road are some gums quite foreign to the western part of the formation. These are the Messmate, *Eucalyptus obliqua*, Red Stringybark, *E. macrorrhyncha*, and the Apple Gum, *E. Stuartiana*, and have obviously intruded from the eastward.

ADDITIONS TO THE CENSUS OF THE "SANDRINGHAM" FLORA.

h indicates plants found on the foreshore; *l*, those of the "leptospermetum"; *s*, of the scrub-land; *a*, aquatic plants and those in wet ground; *, plants rarely met with.

RANUNCULACEÆ—

* Ranunculus parviflorus, L. var. sessiliflorus—Small-flowered Buttercup.

CRUCIFERÆ—

* Capsella elliptica, C. A. Meyer (*C. procumbens*, Fries) Oval Shepherd's Purse.

a Cardamine hirsuta, Linn.—Hairy Bitter-cress.

ZYGOPHYLLACEÆ—
Tribulus terrestris, L'Obel—Caltrops.
MALVACEÆ—
h Plagianthus spicatus, Benth.—Salt Plagianth.
CARYOPHYLLACEÆ—
Stellaria multiflora, Hook.—Many-flowered Starwort.
Sagina apetala, L. (S. procumbens, L.)—Small Pearlwort.
FICOIDEÆ—
h Mesembryanthemum tegens, F. v. M.—Small Pigface.
POLYGONACEÆ—
a Rumex bidens, R. Br.—Mud Dock.
LEGUMINOSÆ—
s Daviesia latifolia, R. Br.—Broad-leaved Bitter-pea.
s ,, corymbosa, R. Br.—Narrow-leaved Bitter-pea.
s Pultenæa Gunnii, Benth.—Golden Bush-pea.
s Glycine clandestina, Wendl.—Delicate Glycine.
s Acacia stricta, Willd.—Straight-leaved Acacia.
* *s* ,, diffusa, Edw.—Spreading Acacia.
MYRTACEÆ—
* *a* Leptospermum lanigerum, Sm.—Woolly Tea-tree.
s Eucalyptus rostrata, Schlecht.—River Red Gum.
s ,, obliqua, L'Heritier—Messmate.
s ,, macrorrhyncha, F. v. M.—Red Stringybark.
s ,, Stuartiana, F. v. M.—Apple Gum.
UMBELLIFERÆ—
s Hydrocotyle tripartita, R. Br.—Slender Pennywort.
s Xanthosia dissecta, S. Hook.—Cut-leaved Xanthosia.
s Eryngium rostratum, Cav.—Blue Eryngo.
PROTEACEÆ—
* *s* Grevillea ilicifolia, R. Br.—Holly Grevillea.
THYMELIACEÆ—
* *s* Pimelea curviflora, R. Br.—Curved Rice-flower.
RUBIACEÆ—
l Galium umbrosum, Sol.—Tufted Bedstraw.
COMPOSITÆ—
* Aster huegelii, F. v. M. (Olearia ciliata, F. v. M.)—Blue Aster.
* ,, stellulatus, Lab. (Olearia stellulata, D. C.)—Snowbush Aster.
* Helipterum corymbiflorum, Schlecht.—White Sunray.
* *s* Calocephalus lacteus, Less.—Milky Beauty-heads.
s Cassinia arcuata, R. Br.—Drooping Cotton-wood or Chinese Scrub.
s Helichrysum rosmarinifolium, Less.—Rosemary Everlasting.
CAMPANULACEÆ—
Lobelia microsperma, ,, simplicicaulis } (L. gibbosa, Lab.)—Blue Lobelia.
GOODENIACEÆ—
* *s* Velleya paradoxa, R. Br. (Velleia paradoxa, R. Br.)
SCROPHULARINEÆ—
Veronica peregrina, L.—Wandering Speedwell.
ORCHIDEÆ—
* *s* Thelymitra Macmillani, F. v. M.—Red Hood-orchid.
s Diuris palustris, Lindl.—Swamp Diuris.
s ,, punctata, Sm.—Purple Diuris.
s Calochilus Robertsoni, Benth.—Brownbeards.
s ,, campestris, R. Br.—Satyr Orchid.
* *s* Prasophyllum Frenchii, F. v. M.—Stout Leek-orchid.
* *s* ,, Dixoni, F. v. M.—Dixon Leek-orchid.
s Lyperanthus Burnettii, F. v. M. (Burnettia cuneata, Lindl.)—Wedge-leaved Burnettia.
s Caladenia congesta, R. Br.—Slender Caladenia.
s Chiloglottis diphylla, R. Br.—Twin-leaved Bird-orchid.

LILIACEÆ—
s Dianella longifolia, R. Br. (D. lævis, R. Br.)—Long-leaved Flax-lily.
**s* Thysanotus tuberosus, R. Br.—Bulbous Fringe-lily.
s Xerotes glauca, R. Br.—Pale Mat-rush.

TYPHACEÆ—
a Typha angustifolia, L.—Bulrush.

RESTIACEÆ—
s Lepyrodia Tasmanica, J. Hook.—Tasman Scale-rush.
Aphelia pumilio, F. v. M.—Dwarf Aphelia.

CYPERACEÆ—
a Heleocharis sphacelata, R. Br.—Tall Spike-rush.
a ,, acuta, R. Br.—Common Spike-rush.
a Scirpus inundatus, Spreng.—Swamp Club-rush.
a ,, prolifer, Rottb.—Budding Club-rush.
a Schœnus axillaris, Poiret—Dwarf Bog-rush.
s Lepidospora tenuissima, F. v. M.—Coast Bog-rush.
s Lepidosperma exaltatum, R. Br.—Giant Sword-sedge.
s ,, concavum, R. Br.—Hill Sword-sedge.
s ,, lineare, R. Br.—Narrow Sword-sedge.
s ,, filiforme, Lab.—Thread Sword-sedge.
s Cladium radula, R. Br. (Gahnia radula, R. Br.)—Black Saw-sedge.
s ,, psittacorum, F. v. M. (Gahnia psittacorum, Lab.)—Giant Saw-sedge.
s ,, tetraquetrum, J. Hooker—Angular Twig-rush.

GRAMINEÆ—
Zoysia pungens, Willd.—Prickly Couch grass.
s Eragrostis Brownii, Nees.—Common Love-grass.

LYCOPODINEÆ—
s Lycopodium laterale, R. Br.—Creeping Club-moss.
s Selaginella Preissiana, Spreng.—Preiss Club-moss.

FILICES—
s Alsophila australis, R. Br.—Prickly Tree-fern.
s Dicksonia Billardieri, F. v. M. (D. antarctica, Lab.)—Common Tree-fern.
a Pteris incisa, Thunb.—Batswing Fern.
s Polypodium punctatum, Thunb.—Ground Polypody.

These 73 additions to the census raise the total number of species (phanerogams and pteridophytes only) to 460. Those strictly Australasian number 316—68.5 %; those ranging also outside 144—nearly 31.5 %, and occurring also in New Zealand 120—over 26 %. 403 species are common to four or a greater number of States—88 %, leaving only 54 with a more restricted distribution, and of these only 5, or just over 1 %, are endemic to Victoria. The latter include *Mesembryanthemum tegens*, *Prasophyllum Frenchii* and *P. Dixoni*. The tally of terrestrial orchids is now 66 (if *Pterostylis præcox* is considered a variety of *P. reflexa*) out of a total of 88 for the State—75 %; and Gastrodia and Drakæa are the only genera unrepresented.

It is interesting to note that 11 species among 37 mentioned by Dr. Cockayne as being characteristic of the northern heath of New Zealand also occur in the Sandringham district. In the census *Spergularia rubra*, Presl., should be *S. rubra*, Cambess., and Sea Lime-grass should read Sea Lyme-grass.

As confirming the opinion already expressed that the Sandringham formation probably extended to Hawthorn and

Camberwell, Mr. Topp writes:—" . . . . about 15 years ago a large number of the most numerous individuals of the species of the Sandringham scrub were to be found in paddocks on the Burke-road, Camberwell, *e.g.*:—Styphelias, Correas, Hibbertias, Asters, Pultenæas, Droseras, *Leptospermum scoparium*, *L. myrsinoides*, &c. Recent investigation, however, proves that it goes much further, though exact definition of its original limits is possible only from Springvale southward. Here the scrub-land, containing all the species most characteristic of it, ends in places quite abruptly on the lightly-timbered Red Gum flats near Dandenong. In other places the transition is not so well marked, the scrub gradually thinning out, some of its plants and the gums common to it mingling with those of the adjacent formation. Northward from Springvale the boundary is so ill-defined that it is possible to mark it out only from the evidence of occasional patches of scrub, by the presence here and there of characteristic plants, but mostly the appearance of soil alone has to be depended on.

Near Mordialloc the scrub is separated from the creek by flats, once swamps, and originally covered in great parts by a dense growth of the Swamp Paper-bark, *Melaleuca cricifolia*; further from the town the Red Gum flats intervene. From the vicinity of the Dandenong Creek the boundary runs in a north-easterly direction to within a mile or so of Dandenong, on the road to that place from Mentone. It goes still a little further east from here, and then turns north-west past the Springvale station, crossing the line a little west of it. Judging mainly from the nature of the soil, it continues in the same direction a little west of Notting Hill to Scotchman's Creek. A small area of the formation exists in the vicinity of Clayton station, considerable tracts of it between Clayton-road and Oakleigh, and Leptospermum and bracken in the town itself. Just opposite to Oakleigh, on the high ground between the creek and Waverley-road, is an area containing bracken, Ricinocarpus, Correa, *Leptospermum myrsinoides*, &c. From here the line follows the course of Scotchman's Creek, and about midway between Waverley-road and High-street turns again north-west, passing well to the east of Burwood and a little east of Canterbury station.

A fairly large area south of Riversdale and east of Boundary-road, wooded with *Eucalyptus viminalis*, and containing now only bracken, Aotus, *Leptospermum scoparium*, *Bossiæa prostrata*, and *Styphelia humifusa*, helps to mark the line. In this locality the formation may be said to come in touch with that of the Ringwood district.

From Canterbury, after going a little north, the line passes in a westerly direction through Kew, and ends in the vicinity of

the Asylum. Regarding this part of the northern boundary of the area, it may be mentioned that Mr. F G. A. Barnard, in his recently published "History of Kew," speaking of the south-eastern portion of the borough, says :—" . . . . on some of this land the native heath used to flourish, along with many another wild-flower, but all have long since vanished." He tells me that the spot more particularly referred to was a paddock at the corner of Barker's-road and Wrixon-street (the continuation of Auburn-road) ; that the same kinds of vegetation used to occur a little further east, on the Hawthorn side of Barker's-road, and extended through to Harcourt-street. In Burke-road south, just below Anderson-street, was a small paddock, now occupied by a violet farm, in which *Pterostylis reflexa* could be found. The best collecting-ground that he remembers was known as Snowdon's paddock, in Canterbury-road, Camberwell, now the site of Hopetoun-avenue and numerous villas, where as late as 1887 the singular brown orchid, *Caladenia suaveolens*, Thelymitras, tea-tree, &c., still existed.

Although bounds have been set to the formation, this does not mean that in places it did not perhaps exceed them, or that it occupied the whole of the area included by them. The valleys of Gardiner's Creek and its branches were only in part covered by it. It was most likely not existent over by far the greater extent of Hawthorn, nor was it present on the highest parts of the south bank of the Yarra, where the bedrock comes to the surface. Again, only a comparatively small portion of the area now bounded by Fitzroy-street, St. Kilda-road, and the Yarra was ever covered by it. Here most of the land was originally only a few feet above sea-level, and now, apart from Emerald Hill, very little of it has an elevation of more than 10 feet or a little more. Out of this "the Hill" stood up like an island, with lagoons and many swamps surrounding it, and precisely what vegetation originally covered it is difficult to say. Although recourse has been had to early publications likely to throw any light on its original appearance, and to old inhabitants, very little exact information has been gained. Hoddle's plan has on its site "grassy hills, forest land." Mr. Pritchard tells us in his "Geology of Melbourne" that its composition is similar to that of Batman's and Hotham Hills, across the river, and made up of the Older Basalt, capped by sands and gravels of the Miocene or Kalimnan age. He has, no doubt, authority for more definitely stating that eucalypts, sheoaks, wattles, and many other plants existed there. If it had carried the characteristic "Sandringham formation," which is never at any time "emerald," it had hardly have earned the name it once bore, and we must conclude that its forest was very open, composed of the trees mentioned by Mr. Pritchard, and grassed as Hoddle describes it.

With regard to the surroundings of "the Hill," I am able to say from personal recollection that the Coast Tea-tree existed at the back of the targets on the rifle-butts, and elsewhere, vestiges of it remaining until quite lately behind the fishermen's huts at Port Melbourne. It is probable it was discontinuous all along the bay front. My own school-boy rambles enable me to say also that there were shifting sand-dunes, almost devoid of any plant life, extending for some hundreds of yards back from the water at one point at least. This was just south of the battery, about and beyond the corrugated iron building which housed the nearly-time-expired prisoners then at work on the military road. The Butts, where now is Middle Park, I can distinctly remember as being very swampy in parts and only sparsely covered with lowly plants. Concerning the locality beyond the Sandridge Lagoon, where landing was effected by the earliest comers to Melbourne, the following excerpt from the manuscript of Josephine Antoinette Macdonald, of Wellington, N.Z., is of some interest. This I am permitted to include here by the courtesy of Mr. Greig, hon. secretary of the Historical Society of Victoria, the possessor of the document. Mrs. Macdonald was a daughter of the late Wilbraham Frederich Evelyn Liardet, after whom the beach at Port Melbourne was first named, and arrived in the colony with her father in 1838, when about 8 years of age. This lady writes:—" . . . . Liardet's Beach . . . . was at this time a beautiful, clean, white sandy beach, covered thickly with a great variety of lovely both small and large shells, and quite close down to where the tide came up there was a skirting of what we called the tea-tree. Above that again, all along the beach, grew the wild cactus" (surely the Angled Pigface) "that produced a rich-looking flower of a dark mauve, with a yellow centre, and an insipid kind of fruit, full of small seeds, about the size of a large gooseberry; there were thousands of other pretty wild-flowers of all colours right on as far as we could walk, up to a lagoon which I think had become filled up before I left Victoria. It was just on this spot where the only thing to show that man had ever trod before met our surprised young eyes; it was a post with a small cask nailed to it, and which we were told was placed there by Mr. Batman. Beyond all these lovely flowers was the forest and the silver wattle, which we in New Zealand prize very much; then the he-oak and the she-oak—both trees apart from each other look the same, but when you see them growing together you see that instead of leaves they have needles like pine trees, and the needles of one tree droop down, while the needles of the other stand up; then the wild cherry, which is another peculiar tree, for the stone grows outside at the end of the cherry instead of inside the fruit. There were also lots of blue gums, or eucalypts,

from which my little brothers and sisters used to gather the manna which fell down from them." The oaks referred to here were obviously the Drooping Sheoak, *Casuarina quadrivalvis*, and the Black Sheoak, *C. suberosa*, and the gum the Manna Gum, *Eucalyptus viminalis*.

The "Plan of North and South Melbourne," surveyed by Robert Hoddle in 1842, also furnishes some information regarding the vegetation of the area. This most interesting document I was privileged to inspect by the kindness of Mr. Saxton, of the Lands Department. On it the south bank of the Yarra right up to the site of Prince's Bridge is shown to be bordered with a dense growth of the Swamp Paper-bark. The belt was of varying thickness, and widest in the swampy bend of the river then or after known as Fisherman's Bend—now Coode Island. Nearly opposite Spencer-street, and outside the Paper-bark, occurred "scrub and trees," and a large area between this and what is now City-road is marked "poor, sandy forest land." The flats between "the Hill" and the river and St. Kilda-road are generally described as "marshy plain, occasionally covered with water." Clumps of tea-tree (Paper-bark) are represented as existing about the swampy land along what is now St. Kilda-road. Albert Park Lake was not then one piece of water, but seemingly several swampy water-holes with a bordering of the same Paper-bark.

To the west of Bay-street, Sandridge (the part described by Mrs. Macdonald), the foreshore is marked as "barren heath, bare of trees," and "honeysuckle." Between the "saltwater shallow lagoon," which curtailed the rambles of Liardet's children—the mouth of which now exists as a boat harbour—and the "dray track to Melbourne," corresponding to the present Fitzroy-street, the foreshore is marked in places "rushes," with again "barren heath, bare of trees." Swamps are represented back of this, and between these swamps and the others now constituting the Albert Park Lake, the interval is set down "sandy forest land, the timber indifferent, consisting of Eucalypti, Casuarina, Mimosa." There is thus sufficient evidence to show that "the heath" extended in a narrow strip almost to the mouth of the Yarra, but the remainder of the area, being wet and saline ground, subject to floods, must certainly have carried mainly plants characteristic of such situations, such as salt-bushes and other salt-loving plants, with the trees mentioned, and perhaps outlying small patches of the heath.

As can be seen by reference to the map, vestiges of the original vegetation still exist comparatively close to the city—notably, near the Brighton Cemetery, along the Rosstown railway, and near Ashburton, in the angle between the outer circle railway and Gardiner's Creek. Here may still be seen, in association with a

grove of *Eucalyptus viminalis*, bracken, *Correa speciosa*, *Leptospermum lævigatum*, *L. scoparium*, *Bossiæa cinerea*, Bursaria, Tetratheca, *Styphelia virgata*, and others. There are groves of the same eucalypt on the other side of the creek in Malvern, but all the under-scrub except the bracken has long since disappeared.

Sandringham, so long a favourite locality for our Club excursions, will soon be completely denuded of its heath grounds. The only large block now remaining, that north of Bay-road, is at the present moment being cut up for building sites. The belt of Leptospermum along the cliff edge as far as Black Rock is already spoilt by the crowds of picnickers which frequent it in holiday time, and after this year the name of Sandringham must necessarily cease to appear on our programmes.

Black Rock is also becoming covered with habitations, and the Ebden estate, which it was once hoped might be reserved for the preservation of the native flora, will at an early date be thickly populated. At the present time the largest unspoilt areas available for purposes of botanical study exist between Black Rock, Beaumaris, and Cheltenham, and from there on towards Oakleigh, and south from Clayton and Springvale. Even these must disappear in the near future, for, apart from their desirability as sites for habitations, the soil is eminently suited for market-gardens.

Just here is perhaps an appropriate place, in view of the inevitable extinction of the flora elsewhere, to express the hope that the two proprietary golf clubs—the Royal Melbourne at Sandringham, and the Metropolitan at Oakleigh—may elect, if they have not already done so, to most scrupulously conserve on their links wherever possible the vegetation already existing. It may even be urged that they plant also only such species native to the formation as do not happen to occur there now, so that the old original flora of the district may be represented as completely as possible. By so doing they would stamp the links with a character not possessed by others and establish natural botanical gardens which could not fail to be attractive to their own members, and which would be of absorbing interest to those botanists who might be privileged to visit them in future years.

As the eastern limits of the formation are approached it will be noticed that plants which may be described as naturalized aliens from the neighbouring formations begin to appear. The Daviesias, *Pultenæa Gunnii*, *Acacia diffusa*, *Leptospermum lanigerum*, *Cassinia arcuata*, the gums now added to the list, and the ferns found at the spring south of Oakleigh are certainly not characteristic of the district. The complex low growth met with near the sea, where as many as 25 species can often be reached from one standpoint, is still present on the higher and

drier ground, but on lower levels, where the water content of the soil is greater, plants such as *Viminaria denudata*, the Melaleucas, Sprengelia, *Epacris obtusifolia*, *Lycopodium laterale*, Selaginella, Xyris, Cyperaceous and Juncaceous plants, appear to a much greater degree than in the west. Groves of *Eucalyptus viminalis* are much more often met with, and definite associations are more obvious. The most striking of these are made up of *Eucalyptus viminalis*, bracken, and a limited number of the plants most characteristic of the formation, growing in a more open fashion: or the gum associated only with bracken and Ricinocarpus, or bracken and *Leptospermum scoparium*.

A very definite association exists just off the Heatherton-road, composed of four strata, or stories, *Melaleuca squarrosa* being dominant and constituting the facies (the primary, superior layer, first distinguished). *Epacris obtusifolia* coming next in importance and height, but only recognized when at closer quarters, followed by bracken, with the floor occupied by Selaginella. Among this select company are occasional plants of Sprengelia, *Leptospermum scoparium*, *Acacia oxycedrus*, and *Hibbertia fasciculata*. Near this association is an example of invasion by the neighbouring vegetation of a piece of cleared and once cultivated ground. The plant association at present existing is still very open, and it would be most interesting to watch its future progress. Other groupings, though less striking, may be seen near the spring reserve at Clayton, where *Leptospermum myrsinoides* preponderates, *Ricinocarpus pinifolius* is secondary, and occasional plants of *Acacia oxycedrus* and *Casuarina distyla* catch the eye. Presently, at a lower elevation, *Melaleuca squarrosa* is dominant, *Lepidosperma longitudinale* and Sprengelia coming next in frequency, and *Acacia verticillata* and *Persoonia juniperina* occasionally. Near the Cheltenham water reserve *Leptospermum myrsinoides* again prevails in one place, with a plentiful admixture of *Styphelia virgata* and *Epacris impressa*, the subordinate plants being stunted Banksias, Ricinocarpus, Asters, &c. Earlier or later in the season the "aspect" varies, more particularly with regard to the secondary plants of the associations. Damp, flat places which seem to be monopolized by Lepidosperma at one time, are later seen to be associated with Limnanthemum and *Brachycome cardiocarpa* or Craspedia, &c. Generally speaking, growth in this damper locality is taller than nearer the sea, Ricinocarpus, for example, attaining a height of about 10 feet on the Turtle-road. Towards the eastern boundary better opportunities are afforded for studying what Clements terms "ecotones" or tension lines between adjoining formations, associations, and zones of plants. These are the lines where competition is going on not only between individuals, but also

between associations of plants; where, as physical conditions alter, where the factors determining the growth of vegetation vary, now one side, now the other, gains advantage and extends its range at the expense of its neighbour.

According to Clements, the plant association (formation, &c.) is to be regarded as a more or less complex organism, the result of certain factors present within the given area, the principal of these being the water content of the soil, humidity, light and temperature—and all capable of measurement. Shortly, the formation is the expression of a habitat, which term is exactly equivalent to environment. It possesses functions and structure, and passes through a cycle of development similar to that of a plant. As the simplest illustration, take an area hitherto unoccupied by plant life (*open*). An individual plant arises in this area, its seed having migrated from a distance—the plant thus must have *mobility*. This plant establishes itself and reproduces itself (*ecesis*). Migration and ecesis constitute *invasion*. An aggregation of individuals occurs, yielding the simplest *association*—a *group* in vegetation, the *family*; further grouping of these results in a *community*. Especially when more than one species is taking possession of the ground, variety is given to the association, zones and layers, &c., are formed, giving it *structure*. According to the seasons it presents different appearances or *aspects*. For the areas controlled by principal species, but changing from aspect to aspect, Clements proposes the term *society*. The primary divisions of a formation he would call *consociations* or *consocies*, and would apply the term to an area characterized by a *facies* (dominant species of the formation). When the whole of a natural area is covered with vegetation the formation is said to be a *closed* one, and its stability is greater than ever before. But there is no stasis. Change is always going on, competition still keen, and as the factors vary other plants better suited to the changed conditions invade the formation, and *succession* occurs. The final result is generally the forest after a series of these successions.

To those establishing collections of dried plants, some of the suggestions of Clements in favour of formational herbaria may be of interest. Instead of the usual grouping in genera and families, he would have the plants arranged with regard to their position in the formation. This certainly seems most rational, and, as he says, permits of definite comparison between vegetations occurring in different localities. Specimens should, of course, show both flower and fruit, with the underground parts present and as perfect as possible. The grouping of the specimens should have respect to their time of appearance, their abundance, their importance as constituting the "facies," and definite associations in the formation should also

be taken into account. With the plants should be data concerning migrational contrivances, seed production, pollination and period of flowering, in addition to the name, date, and place of collection, the vegetation form of the plant, &c., and, if possible, photographs giving a general view of the formation, its physiographic setting, nearer views of its seasonal aspects, detail views of its structure (associations, zones, layers, &c.), and flower portraits of the constituent species.

Briefly referring to a few of the more characteristic and more interesting of the plants of the district, the Coast Tea-tree is found to occur more frequently and widely than was at first thought. To the south it is, no doubt on account of its being less restricted, much more abundant, and the belt along the sea front much wider. It is seen often almost at the extreme edge of the formation about Springvale, on both sides of High-street, near Ashburton, and the existence of hedges to the north of Burwood leads one to suppose it originally grew there naturally. The Swamp Paper-bark, *Melaleuca ericifolia*, naturally bounded the formation north and south, and was the principal plant of the creek valley. A lover of wet ground, it is not seen until the region of the springs and swamps is come to in the eastern part of our area. When conditions are favourable it is, like the Coast Tea-tree, a *socially exclusive* plant, forming dense closed associations with only a few climbers and wet-ground plants existing for a little distance among its close-set stems.

Concerning the plants found in the area but not characteristic of the formation, the great majority are explicable by their occurrence in adjoining formations. With regard to *Oxylobium ellipticum*, Mr. Charles French has shown that it is an escapee. The case is more difficult with *Grevillea ilicifolia* and *Lasiopetalum Baueri*, seemingly far removed from their natural habitats, and for them an explanation is not ventured at present.

As to the map which accompanies these notes, I would not have it supposed that it indicates *all* the patches of formation at present existing, or even indicates them exactly. I think, however, it may be taken to show all the larger areas. For that it is by no means perfect, my excuse must be that time and opportunity have not permitted me to traverse every road in the district, and that the assistance I had hoped to get from a quarter most likely to furnish more exact data was unfortunately unobtainable. I hope, however, it may be helpful, and enable members to visit localities which without its aid might remain unknown to them.

The meteorological records so kindly given by Mr. P. Baracchi, Government Astronomer, will help to explain the vegetation generally covering the district, and also the difference between that occupying its eastern portion and that nearer to the sea.

AVERAGE RAINFALL, MEAN TEMPERATURES, AVERAGE NUMBER OF WET DAYS.

MONTH.	Melbourne. 56 Years.			Camberwell. 11 Years			Brighton. 19 Years.			Caulfield. 20 Years.		Murrumbeena. 22 Years.		Mordialloc 6 Years.		Averages in first three Stations			Averages all Stations.	
	Inches.	Days.	Temp.	Inches.	Days.	Temp.	Inches.	Days.	Temp.	Inches.	Days.	Inches.	Days	Inches.	Days	Inches.	Days	Temp.	Inches.	Days.
January ..	1 87	7	66.2	2.99	8	68.1	1.94	8	66.3	2.21	8	2.54	11	1.73	5	2.26	7.6	66.8	2.21	7.8
February	1.75	6	66.3	1.94	7	68.3	1.22	5	65.6	1.38	5	1.55	7	1.96	4	1.63	6	66.7	1.63	5.6
March ...	2.21	8	63.5	2.86	10	63.3	2.24	8	61.8	2.55	9	2.48	11	3.21	6	2.43	8.6	62.8	2.59	8
April ...	2.31	10	58.5	2.87	12	59.1	2.23	11	57.9	2.98	10	3.17	12	1 91	8	2.47	10.6	58.5	2.58	10.5
May ...	2.16	12	53.4	2.48	13	53.2	2.35	13	53.2	2.71	13	2.78	15	2 66	11	2.33	12.6	53.2	2.52	12.8
June ...	2.12	13	49.6	2.48	16	49.6	2.37	17	49	2.46	13	2.68	15	2.41	11	2.32	15.3	49.4	2.42	14.1
July ...	1.85	14	47.6	1.78	15	48.1	2.16	15	47.1	2.39	13	2.56	17	2.29	10	1.93	14.6	47.6	2.17	14
August ...	1.81	13	50.3	2.35	15	49 4	2 46	16	48.7	2.05	13	2.28	17	2.09	11	2.20	14.6	49.4	2.17	14
Sept. ...	2.34	13	52.9	2.36	14	53.2	2.30	13	51.9	2.38	13	2.60	16	2.27	11	2.33	13.3	52.6	2.37	13.3
October .	2.65	13	56.4	2.17	13	57.4	2.30	13	55.9	2.48	10	2.74	14	2.21	10	2 37	13.3	56.5	2.42	12.1
November	2.20	10	60.5	1.55	9	62.0	1.81	9	60.8	2 03	9	2.37	11	1.95	5	1.85	9.3	61.1	1.98	8.8
December	2.27	9	63.4	2.12	8	66.2	1.90	8	63.2	2.13	8	2.61	10	2.23	6	2.09	8.3	64.2	2.21	8.1
Totals and Averages	25.54	128	57.4	27.96	140	58.2	25.28	136	56.8	27.75	124	30 36	156	26.90	97	26.26	134	57.4	27 29	130


HOBSONS BAY
MELBOURNE
MELBOURNE GOLF LINKS
MOONEE PONDS CREEK